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EDITOR'S NOTE

This English translation has not been published in printed form/Cette traduction anglaise n'a pas été publiée sous forme imprimée.

1 If this special report had been drawn up in a different European national context[1], it would probably not have had the same title: "Public understanding of science" in Great Britain, "Culture of science and techniques" in Portugal or the French-speaking part of Belgium and in France, or "Understanding of sciences and human and social sciences" in German-speaking and Scandinavian countries. These terms reflect the existence of local specificities, traditions and meanings which slide in under the unifying system of programmes covered by European discourse. Even the term "science" conveys a diversity of meanings. In France, Portugal, the French-speaking part of Belgium and Great Britain, it is usually given a rather narrow meaning: "sciences" usually refer to the natural sciences and mathematics. Sweden, the Flemish-speaking part of Belgium and Austria, to take just a few examples, give the words *Wissenschaft*, *Vetenskap* and *Wetenschap* a broader meaning, taking in the humanities and the social sciences. These different acceptations affect the content of the "culture" or "public understanding" of the sciences: does this involve, as in Sweden, carrying out activities to popularise the natural sciences and the human sciences or, on the contrary – as in France and Portugal –, giving more prominence to the natural sciences? And what of the extension of the labels regarding the communication of the sciences to include the terms "technology" or even "industry", as is the case in France? A second dividing line – which cannot be overlaid on the first – draws a distinction between two traditions. The notion of the *Public Understanding of*

Science (PUS) is standard in Great Britain, Austria, Sweden, etc. In the 2000s it was sometimes broadened to PUSH (*Public Understanding of Science and Humanities*), particularly in Germany. The notion of a culture of science and technology (CST) is the driving force for activities and considerations in French-speaking and Romance-language countries. These denominations bring different presuppositions into play. PUS places emphasis on members of the public and the level of their understanding and representations of science, which in an ideal world would be measurable. CST is more a matter of incorporating science into general public culture, supplying the necessary baggage of scientific knowledge to enable people to find their own way around present-day society. However, the dividing line between the two is never either clear or definitive: the concepts are reworked according to specific contexts, and indeed the national and regional terrains occupied by CST and PUS in the different European countries are far from being blank pages. Quite the contrary, in fact, as traditions in communication and ways of presenting science were well-established long before the introduction of PUS and CST. What is more, these "models" have to face up to local political methods: is there, for example, a culture of citizen participation or consultation, or not[2]? The "models" exported will necessarily have to cope with these different contexts which, moreover, may give rise to forms of mediatisation that are sometimes completely new, such as the "consensus conferences" which came into being in Denmark in the 1980s quite separate from the classic "models" of communication and scientific mediatisation. What is more, these concepts and practices do not migrate without taking with them implicit meanings and conditions which are not always understandable and/or acceptable in the various national contexts. Importing the PUS debate into German-speaking countries, for example, gave rise to some substantial changes in meaning, as the "S" standing for science does not correspond to the scope of *Wissenchaft*. These fundamental local differentiations point to the difficulties faced by organised systems of programmes in Europe which attempt to unify communication on science and technology by laying down "good practices" or by attempting to measure their degree of "transferability". They also draw attention to the fact that there are hardly any models specific to a single country or group of countries, but rather a number of creations, fragmented adaptations and imports, which are always recontextualised.

Communicating about science and technology – traditions and ruptures

2 The 1970s and 1980s saw a revival of thinking about communication on science and technology in France and in Great Britain which went hand in hand with the need the governments and institutions felt to develop the technological sciences and find ways of encouraging the general public to accept and support them (Petitjean, 1998; Irwin, 1996). It was against this background that the PUS movement emerged in Great Britain, and CST in France. In Europe, organised systems of programmes were for a long time based on these practices, directives and ways of thinking which had initially been formalised and institutionalised in the two countries, although PUS was of greater importance. The initial "selection" by Europe of what has been called the PUS and CST "models" left its mark on guidance policies, contained implicit "values" and economic presuppositions, and produced a frequently linear conception of communication (Felt, 2003). We feel it is important to consider this early stage briefly. The initial stakeholders in PUS and CST

came from among the scientific community, but the ambitions, methods, and interfaces between stakeholders and the developments in the two movements have been very different. CST came into being in France, pushed forward since the 1970s by militant scientists – mainly physicists – who wanted to democratise science and make it an integral part of culture. Jean-Marc Lévy-Leblond (1973), one of the key players in the movement, was behind a number of appeals in favour of incorporating science in general culture. Indeed this first developed in France's "culture centres" (*maisons de culture*), particularly in Grenoble. In the 1980s, the ambitions of CST militants came up against the interests of the government which, under the direction of Jean-Pierre Chevènement, was explicit in considering that public support for technical and scientific developments would promote the nation's economic development. The "research assizes" (*Assises de la Recherche*) organised in 1981-1982 by the newly-established Ministry of Research resulted in legislation passed in 1982 and 1984[3] which included the activity of vulgarisation in the missions of the researcher; in addition, specific networks and places have been devoted to CST (Caune, 2005; Fayard, 1994). In Great Britain in 1985, the Royal Society commissioned a report on the public's understanding of the sciences, its level, and ways of improving it. Here again, this involved promoting the public's acceptance and recognition of technical and scientific developments and shaping "science-minded citizens". The Bodmer Report reached the conclusion that the members of the British public were suffering from a flagrant lack of knowledge, whereas science and technology were occupying an increasingly important part of both society and their everyday lives, advocating the development of PUS activities aimed at giving science and technology a positive image (Bodmer, 1985). Promoting such activities became one of the Royal Society's priority missions; they were to involve both scientists and the media. Scientists fell in with the idea as it gave them a means of justifying their activity and its utility, a crucial point just at a time when research budgets were limited. The "PUS movement" arose out of this ambience of defending science and educating the citizen.

3 In parallel with these movements, and in both countries, social science researchers have moved into the field, although their favoured topics differ somewhat. In France, intellectuals of the likes of Baudoin Jurdant (1973), Philippe Roqueplo (1974), Éric Fouquier and Eliseo Veron (1986), Pierre Fayard (1988), Daniel Jacobi and Bernard Schiele (1988), or more recently Daniel Raichvarg and Jean Jacques (1991), and Yves Jeanneret (1994), took an interest in the sharing of knowledge, in vulgarisation, often from a historical or semiological viewpoint, as in the distance that is constructed between the sacred and the profane, and the complex relationships between science and ideology, for example. In Great Britain, the Bodmer Report and the incentive programmes devised by the Royal Society and the British Association for the Advancement of Science led to a quantity of research into the quality and quality of science's target groups. This research gave rise to lively debate regarding "scientific literacy" and the deficit model, comparing more particularly the work of John Durant and others (1992), Alan Irwin (1996), and Brian Wynne (1992, 1995). The question of "public uptake" (the public appropriation of science and technologies) constitutes one of the focal points of this debate. We shall not attempt to quote all the authors who contributed to setting up thinking on this point from the 1970s to the 1990s, in both France and Great Britain. Their number and the diversity of their approaches is nevertheless an indicator of the inaugural wealth of this field of research[4]. In 1993, this burgeoning produced a pair of written works, witness to the permeability of the two traditions and to the expectations of the researchers in relation

to Europe, which was in fact one of the co-financers, through DG XII: *Science and Culture in Europe*, published in the multidiscipline review *Alliage*, directed by Jean-Marc Lévy-Leblond, in France, and by *Science and Culture in Europe*, devised by Lévy-Leblond and coordinated by John Durant and Jane Gregory, published by the Science Museum. These works are emblematic of a desire to report on the wealth of the PUS and CST movements, to build bridges between the traditions with regard to both practices and thinking, and to incorporate them in Europe's future.

4 For their part, the European Union's Framework Programmes for Research and Development (FPRD) are increasingly well funded, and include "science and society" aspects. They consolidate the existing networks in Europe and worldwide. To quote no more than a few – perhaps those with the highest profile – the *Public Communication of Science and Technology* (PCST) network, in which France is extremely active, attempts to take a reflective look at current practices; the *European Network of Science Centres and Museums* (*Ecsite*) links a number of museums devoted to science and technology and constitutes a platform for pooling knowledge and skills, and the *European Association for the Study of Science and Technology* (EASST) brings together European researchers working on matters concerning science and society, including matters with reference to communication in this field. Together with the *Society of Social Studies of Science* (4S), it constitutes one of the two multidisciplinary learned societies that allow the field of science, technology and society to continue to exist and provide a discussion forum and visibility for and federate an epistemic community scattered all over the world. Thus the field has become institutionalised beyond the frontiers of geography and discipline, yet even so has retained "national styles" and competencies in the various disciplines[5]. In this context, the diverse approaches used in this special report are witness to the essential multidisciplinary dimension of studies on science. It will probably be thought unfortunate that experiences in the former Eastern-bloc countries or in the countries of southern Europe are not broached. It is true that we could have chosen to list "typical" methods and to draw up a more complete catalogue, but it is not our aim to propose a map of the areas for thinking that are open in Europe. We have preferred to follow a certain number of tracks that have been opened up, more particularly by a European programme carried out in the early 2000s (Felt, 2003)[6]. The contributions brought together here investigate communicational issues concerning the mediatisation of science and technology, while considering a number of recent concerns that crop up in European discussions on these matters. These concern "citizen engagement'", the involvement of the social sciences, the unification of discourses and communication paradigms, the nomadism of concepts and icons, and the diversification of existing arrangements.

Investigating the move towards "citizen science"

5 The first two texts in this special report highlight a change in the way of thinking about the mediatisation of the sciences and their publics. The historic approach to popularisation developed by Bernadette Bensaude-Vincent shows that vulgarisation is a dated process, characteristic of the twentieth century. It sets up a representation of science as a scheme of autonomous knowledge – all the more so in that it is directed and financed by the State. The members of the public are called on to be consumers of science that is attractive, appealing, simplified, and vulgarised – and indeed sometimes rendered

"vulgar". There is never, however, any serious proposal for the public to approach science more closely. The author then recalls in timely fashion the conclusions reached as early as the 1970s: it is vulgarisation that creates the very gap between sacralised science and a profane public that it claims to bridge. Popular science, at its peak in the nineteenth century and of which Camille Flammarion was one of the most famous representatives, involved an enthusiastic public seizing hold of an alternative form of science which was freely available to them because it was not institutionalised. Vulgarisation puts an end to that ambition, as its aim is to offer a simplified translation of an official science presented to the public as an object to be admired. As a moment in history, vulgarisation now has to face the competition of the emergent citizen sciences of the twenty-first century. Through them, the centre of interest is shifting: it is now less a matter of communicating "in the name of science" and more of making citizens participate "in the name of democracy". This change is evident in the discourse of senior European officials. Incorporating the critique of their own presuppositions, the organised systems of programmes in Europe concerning the "improvement" of relations between the sciences, technology and their publics are strengthened by the evolutions in academic debates. Identifying four key moments in European discourses, Ulrike Felt questions both the evolution and the sturdiness of certain presuppositions. In the 1980 and 1990s, the deficit model, supported by Euro-barometer surveys, imposed the necessity of informing a public with no knowledge of science and consequently distrustful of its developments. Here again, the idea is to bridge the gap of ignorance. The 2000s saw an increasingly insistent valorisation of initiatives involving "the citizen" in techno-scientific choices. Europe inventories, measures and calibrates initiatives in its member States and issues a set of "good practices" which allocate a new role to the members of the public: henceforth they must be in a position to participate, to engage. However, this change in discursive orientation only partly hides the constants which limit the scope of this evolution. The formalisation of the problem and the solutions envisaged remain unchanged, the aim of the mediatisation of the sciences being to contribute to making Europe "the most competitive and dynamic knowledge-based economy in the world [...] with more and better jobs and greater social cohesion" (EC, 2000). In this context, the public – often described as vague, worried, poorly informed, and distrustful – constitutes an obstacle rather than a resource. Thus whatever arrangements are being considered – informing the citizen-public, increasing its awareness, or involving it in the process – science systematically remains the dominant, ultimate reference.

Considering the relationships between local and global levels

6 Senior European officials thus place the "universality of scientific responses" at the heart of the discussions on science and society. The inventory of good practices and all the "transferability" measures refer to it: science festivals, science workshops, consensus conferences, etc. These are models that are deemed capable of being both exported and generalised. Felt goes on to highlight a paradox: these arrangements owe their "success" to a considerable extent to their inclusion in culture, and to their compatibility with rituals and local political practices. Is it possible to expect the same "success" if they are de(re)contextualised? These relations between the local and global levels also give us something to think about when we consider the way in which sustainable development is

mediatised. The icons, diagrams, and audiovisual productions on this subject constitute a particularly rich area for analysis, and Yves Jeanneret offers a stimulating approach to the question. In this case, communication does not appear to be burdened with tensions between the specific and the general, but on the contrary plays on and/or with paradoxes in order to produce a "package" that is efficient on both fronts. The author analyses the transformations in discourse, the decontextualisation of words, the construction of optical representations of the objects of knowledge, and shows how the wording of a title – sustainable development – opens up a global agenda which takes root at the local level and tames a set of active forces while still preserving a vision and scientific and liberal "governance" of the issue. Functioning like a global written sign, the notion of "sustainable" incorporates a number of constraints in the form of an organised system of programmes and a necessity: development, ecology, and the social aspect. It is therefore theory, methodology and instrument at one and the same time. Thus the translation of this title into an icon – the rose graph – makes it possible to organise the policy of *sustainability* and to render visible the non-scientific knowledge involved in the construction of the programme. The rose graph places the fields of the economy, ecology and social matters in a functional equivalence and at the same time places sustainable development in a perspective of optimisation mobilising, above all, local management knowledge. However, and without any fundamental contradiction, this highly pragmatic local approach comes up against competition from ceremonial media events, as with the films *Home* (Arthus-Bertrand, 2009) and *An Inconvenient Truth* (Guggenheim, 2006). These audiovisual productions globalise both the outlook and the message. They make it our duty to look at the planet globally, while at the same time domesticating our relationship with our world as our home.

Questioning citizen engagement

7 The imperative of citizen engagement, which Ulrike Felt has identified in European discourses and which Yves Jeanneret has suggested is present in the "duty to look" implicit in optical communication in respect of the title of "sustainable development", represents a henceforth central element in arrangements for the mediatisation of science, whether this involves installations, demonstrations, consultations or hybrid forums. The contributions by Philippe Chavot, Anne Masseran, Alan Irwin and Maja Horst analyse, on the basis of a range of experiences and terrains, the consequences of this mutation in the role conferred on the public: whereas its members were for a long time limited to serving as the "silent witnesses" of developments in the scientific and technological field, its members are now being called on to play the role of "active participants". In a good many European and national discourses and organised systems of programmes on the relationship between science and the public, a serious trend is emerging: science is perceived as an integral part of society, and it belongs to the same world as the citizen. As a result, it is no longer a matter of merely setting science alongside society, but rather of demonstrating that science is part of society – "in society", to adopt the term used in European policies. In the same way, members of the public who have become "citizens" are given rights and are subject to a duty of engagement or at the very least a duty of expression when faced with technical and scientific developments. Identifying three communication paradigms behind the "meeting-points of science and society", Philippe Chavot and Anne Masseran show that

the exhibitions mounted by France's "Scientific Culture Centres" are often guided by the promotion of science in the same way as debates involving citizens may be underpinned by a hierarchy of implicit knowledge and values in which science, as a cultural reference point, predominates. The citizen's supposed "desire" to engage is then shaped by these arrangements, which promote expression and the formation of opinions: places of mediatisation, equipped with formal expression mechanisms or mechanisms that formalise expression, appear to open up to alternative points of view and knowledge, while at the same time assigning them a predefined place and role. Thus the arrangements made for "meeting points" between society and science replay, order and reorganise debates which, when sensitive subjects are involved, often take place outside the institutional framework. In consequence it is legitimate to wonder in what contexts, around what objects in particular, and with what powers the citizen "desires" to engage? And, indeed, why should citizens want to engage? Taking citizen engagement seriously would be tantamount to examining these questions "seriously" even before conceptualising arrangements for participation.

8 Thus the questions raised by the citizen's engagement with the sciences demand a re-examination of the relationship between communication and policy. With this in mind, Alan Irwin analyses the political construction of the scientific citizen: what role and what status are conferred on citizens who participate in debates and public consultations, and on "lay" people sitting on scientific committees? We may of course be sceptical about the mechanisms that constrain or on the contrary force expression. A good number of researchers and critics have demonstrated that these were often mere simulations of debates, the outcome of which was known in advance. Nevertheless, Alan Irwin stresses what can be learned from these discussions: in the debates and consultations we may trace the wealth of public performations of techno-scientific potentialities, and understand what these debates have brought into existence, even if they do not achieve the results anticipated by their initiators and/or by the parties concerned ("stakeholders"). While it is self-evident that citizens assess and express critical judgments, it is still necessary to provide the conditions that confer an effective status on this engagement: this must be done at an earlier stage – before decisions are actually made –, with "lay" people having the status of real stakeholders, recognised as a source of knowledge and opinions. It would then be apparent that focalising on technical and scientific innovations and their capacity to provide the nation with wellbeing and economic strength is not a condition unique to governance and that it would be better to open up and take other perspectives into consideration: the construction (*"building"*) of identities and their possible pooling, the giving of meaning, the active constitution of opinions which are only very occasionally definitively stabilised. In short, the citizen's engagement in consultations and debates can and should be seen as a dynamic, non-fixed expression, far removed from fixation on the production of massive, immediate effects perceptible in a change of citizens' attitude. It is as much to do with communication as it is with politics.

9 Engagement at an early stage does not only concern potentially controversial innovations. It is a prerequisite for effective citizen engagement in the context of any type of research, including research in social sciences which are – should be? – closely interwoven in technical and scientific developments. This is what Maja Horst points to in an analysis of an experiment to which she contributed in two respects, in terms of both research and the devising of an installation placing the research before visitors. The

"stem cells network" installation organised in Copenhagen offers visitors a cognitive and emotional exploration of the social and ethical issues involved in stem cell research. Rather than displaying closed, inward-looking results, the installation displayed a number of hypotheses examined as part of a social sciences research project, and ensured that visitors took part in the project to some extent. It was therefore not merely a matter of "making something felt" through immersion in the processes, results and statements of science. On the contrary, the design team tried to break with both the linear model – even if that were to mean taking on the appearance of immersion – and the deficit model which presupposes a "scientific education" prior to any expression being possible. While it is true that the installation did not achieve all its objectives, it nevertheless constituted a real collective learning process involving social science researchers, artistic designers, and visitors. This co-construction of knowledge was possible because the installation invited citizens to engage in a debate at an early stage in the process, led researchers to question their own presuppositions and to dare to formulate questions rather than answers, and also led its designers to consider that the installation might take on a shape not defined in advance.

Conclusion

10 This special report does not claim to "resolve" any communication issues, or even to open up any new approaches; more prosaically, we hope to make our contribution to the vast work-in-progress represented by the mediatisation of science and technology regarding practices and policies as well as research. The contributions brought together here open up more questions than they stabilise with answers, thereby witnessing to a desire to question – rather than to confirm – any "definitive" result or "saving" directive. And indeed including the sciences in culture in Europe seems to be a fragmented undertaking – perhaps necessarily because of resistance to attempts at unification –, carried out by an epistemic community with varied competencies, traversed by a number of "hot subjects" and structured by sturdy paradigms. This represents a permanent challenge, if only because it constitutes today one of the places where the environmental, social, economic and political stakes crystallise.

NOTES

1. We shall deliberately only refer to Europe, but it goes without saying that research and practices in the field of the mediatisation of science and technology is not restricted to this space alone, and that bridges were first thrown across frontiers and oceans a long time ago.

2. On this point, see chapter 3.5 of the OPUS report: "Public consultation and foresight exercises across six European countries: Similarities and differences" (Felt, 2003).

3. Act No. 1982-610 of 15 July 1982 on guiding and programming research and the technological development of France (Article 24); Act No. 84-52 of 26 January 1984 on higher education.

4. To this decidedly patchy list should also be added the contributions made by sociology and the history of science, which are also involved in the vulgarisation processes. To quote just two

examples taken from these particularly rich areas, mention must be made of the text entitled *Microbes: Guerre et Paix* ("germs: war and peace") (Latour, 1984) which opened up a number of important questions on vulgarisation directed at donors to Pasteurian research. We may also quote, for example, the analysis of the role of the public as gentleman-witness to Boyle's experiments, in *Leviathan and the Air-Pump* (Shapin, Schaffer, 1985).

5. Thus the field of scientific and technological communication has given rise in France to substantial investment on the part of researchers, more particularly in the field of information and communication sciences. The media – taken broadly – and/or the public space have constituted one of the preferred areas of study of these researchers, including I. Babou, P. Charaudeau, S. de Cheveigné, P. Hert, Y. Jeanneret, J. Le Marec, B. Miège, I. Pailliart, and D. Raichvarg. For a partial report, see Le Marec and Babou (2005), or Pailliart (2005).

6. Comparison of the discourses, practices and arrangements in six countries – France, Great Britain, Austria, Portugal, Sweden, Belgium – at that time made it possible to cast light on the different traditions in existence (and to see the importance of the PUS and CST models), and to conceive the problem areas in matters concerning transferability.

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